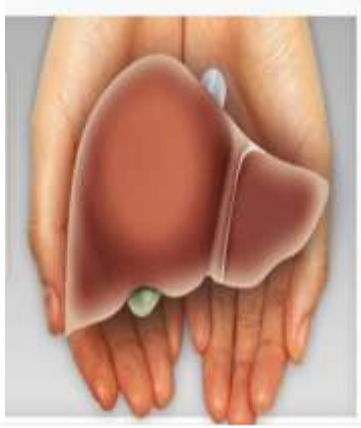
Combined Liver& Kidney Transplant
A Good Option for 1ry HO
An Egyptian Experience

Khaled Eweeda

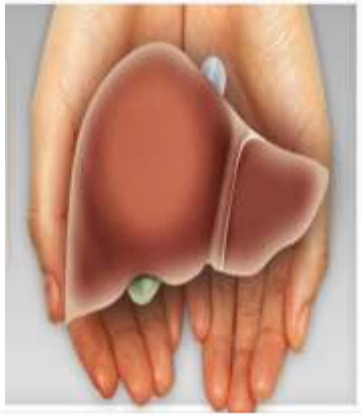
Air Force Specialized Hospital



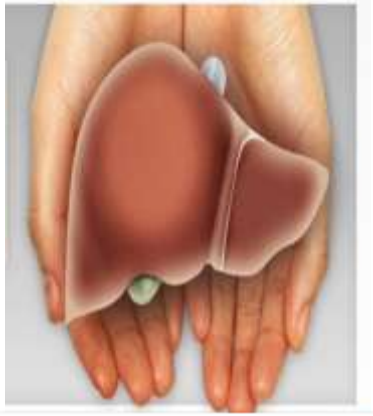
6th Annual MNDU Conference, Nephro-Mansoura,2016

Agenda

- History
- Management of 1ry HO type I
- Sequential Vs Simultaneous CLKT
- MINI cases with MANY messages



History



History

1902	First successful experimental kidney transplant[53]
1906	First human kidney transplant—xenograft[27]
1933	First human kidney transplant—allograft[56]
1950	Revival of experimental kidney transplantation[15,47]
1950-1953	Human kidney allografts without immunosuppression, in Paris[16,31,46] and Boston[26]
1953	First use of live related donor, Paris[32]
1954	First transplant between identical twins, Boston[38]
1958	First description of leukocyte antigen Mac[12]
1959-1962	Radiation used for immunosuppression, in Boston[37] and Paris[19,29]
1960	Effectiveness of 6-MP in dog kidney transplants[5,59]
1960	Prolonged graft survival in patient given 6-MP after irradiation[30]
1962	First use of tissue matching to select a donor and recipient[13,30,51]
1966	Recognition that positive crossmatching leads to hyperacute rejection[28,51]
1967	Creation of Eurotransplant[43]
1967	Development of kidney preservation
1973	Description of the transfusion effect[4]
1978	First clinical use of cyclosporine
1978	Application of matching for HLA-DR in renal transplantation[5]
1987	First of new wave of immunosuppressive agents appears (tacrolimus)
1997	Transgenic pigs produced

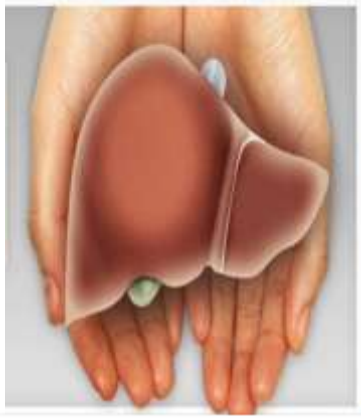
Figure 1–1 Emerich Ullmann (1861-1937) in 1902 carried out the first experimental kidney transplants in dogs. (Courtesy of The Vienna University, Institute for the History of Medicine.)

LONGEST SURVIVOR OF KIDNEY TRANSPLANT RECIPIENT Colorado

Identical Twin transplant in 1962

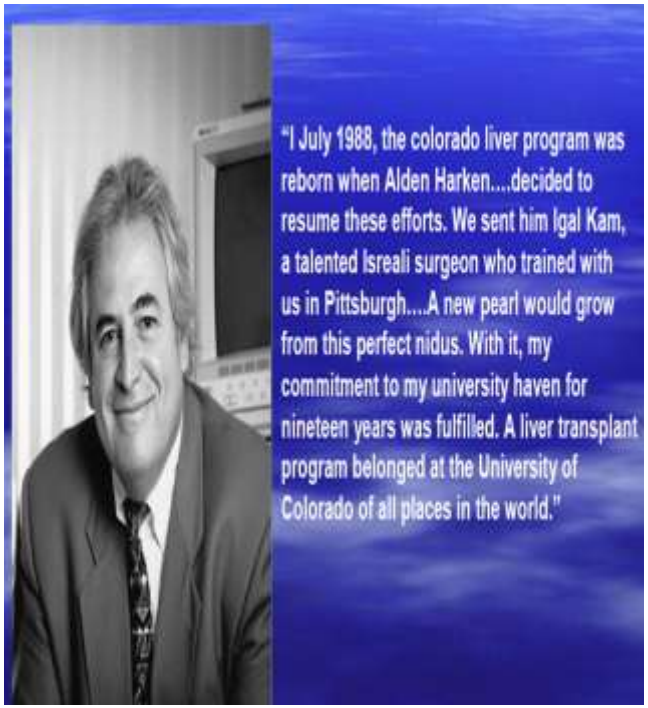
Both donor and recipient are healthy in 2005

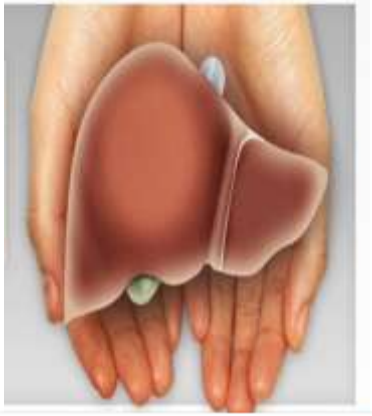
- JW
- March 27, 1962
- Male, age 27 (#1)
- Primary renal disease: GN
- No prior dialysis
- Bilateral nephrectomy
- No immunosuppressant



1st renal Tx in 1962
1st liver Tx in 1963

1st CLKT in 1983
1st protocol of CLKT in 1988





UNOS data 1996-2006

Tx year	No of CLKTs	% to LTx
2001	134	2.4
2002	210	3.7
2003	247	4.1
2004	279	4.2
2005	337	4.8
2006	398	5.5

Management Of 1ry HO Type I

- The efficacy of treatment in PH is dependent on **early** diagnosis.

- The initiation of medical management **as soon as** possible delays ESRD and potentially minimizes non-renal sequelae.

- The definitive cure for PH type 1 is liver transplantation.

1- Medical Management

- Focused on reduction of urinary calcium oxalate saturation and oxalate production, thereby minimizing renal oxalate deposition.

1. Avoidance of foods with high oxalate content.
2. Decrease oxalate deposition by large fluid intake (greater than 3 L/day per 1.73 m^2)
3. Inhibitors of calcium oxalate precipitation. (Mg oxide,NPh)
4. A trial of high-dose pyridoxine , a coenzyme of AGT that promotes the conversion of glyoxylate to glycine, rather than to oxalate.

5. Enhancing oxalate elimination by the GIT is another potential method in reducing tissue and body oxalate levels by the administration of **Oxalobacter formigenes**, an anaerobic colonic bacterium that promotes endogenous oxalate intestinal excretion.

6.Dialysis: conventional HD +/- PD,HDF

2- Transplantation

1. Isolated renal transplantation.
2. Isolated liver transplantation.
3. Combined liver/kidney transplantation (simultaneous Vs sequential)

A- Isolated Renal Tx

Disappointing results according to data from EDTA in 98 transplants due to recurrence in 85% .

NDT 1990;5:332

Recurrence occurred with the support of medical treatment:

- High fluid intake.
- Neutral phosphate.
- Potassium citrate.
- Pyridoxine
- Aggressive pre and post Tx dialysis

B-Isolated Liver Txb

For patient who still with GFR 40-60 ml/min/1.73 m2
Transplantation;2010;15:590

Reluctance for this decision:

Native hepatectomy ,even though liver is normal in other aspects, in the absence of significant renal impairment.

Good GFR permit early and intense medical therapy and hence improved renal survival.

CLKT

Sequential Vs simultaneous

Sequential Tx

- Indicated for the aggressive form of the disease in reducing the risk of kidney injury by allowing intensive dialysis to clear stores of tissue oxalates .

- Good for small recipients for anatomical reasons , medical instability and donor unavailability.

Am.J.Transplant,2010; 10:2493

Simultaneous Transplant

- Renal graft simplifies postoperative period .
- Liver graft provides the missing enzyme thereby lowering oxalate production.

Comparison of Renal Allograft Outcomes in Combined Liver-Kidney Transplantation Versus Subsequent Kidney Transplantation in Liver Transplant Recipients: Analysis of UNOS Database

Nicole Simpson,[1] Yong W. Cho,[1,2] James C. Cicciarelli,[1,2] R. Rick Selby,[1] and Tse-Ling Fong[1,3]

Background. There may be an allograft-enhancing effect by the liver on the renal allograft in the setting of si
neous combined liver-kidney transplantation (CLKT) from the same donor. This study was performed to inve
whether an existing liver allograft could protect a kidney allograft from immunologic injury due to histoincompa
in liver transplant recipients who received sequential kidney transplantation (KALT).
Methods. Using the United Network for Organ Sharing database covering January 1996 to December 2003, ou
of 352 KALT were compared to 1,136 CLKT. Incidence of acute and chronic rejection and rejection-free ren
survival was compared between two groups.
Results. Renal half-life of KALT allografts was shorter than CLKT group (6.6±0.9 vs. 11.7±1.3 years, $P<$
Incidence of chronic rejection in KALT group was higher than CLKT group (4.6 vs. 1.2%, $P<0.001$). One and
year rejection-free renal graft survival of KALT and CLKT groups were different (77% and 67% KALT vs. 85% ar
CLKT, respectively; $P<0.001$). Among human leukocyte antigen mismatched and sensitized patients, rejecti
renal graft survival of KALT group was inferior to the CLKT group (75% at 1 year and 61% 3 years vs. 86% at 1 y
79% 3 years, $P<0.001$).
Conclusion. Liver allograft provided renal graft immunoprotection if both organs are transplanted simultan
(immunogenetic identity), but not for kidneys transplanted subsequently.

Keywords: Rejection, Graft survival.

Clinical Results of Combined and Sequential Liver-Kidney Transplantation: A Single Center Experience

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Nephrology, Dialysis and Transplantation Unit, Molinette Hospital, Turin, Italy

Abstract number: D1649

« Back to 2013 ATC Abstracts

At 5 years, patient survival rates in SLKT were lower than those in CLKT (75% in SLKT vs 90% in CLKT), and in KAT1-2 (100%). Kidney graft survival rates at 1, 5 years were 92% and 84% in CLKT, 100% and 75% in SLKT, 97% and 97% in KAT1, 100% and 100% in KAT2. CLKT and KAT1 kidney graft survival compared using "death censored curves" was the same in both groups (97%) at 1 and 5 years.

In conclusion in CLKT recipients, although complications and mortality were more frequent in the first three months after transplantation, the patient and kidney allograft survival rates appeared to be superior than those in SLKT. In addition, in CLKT there were lower serum creatinine levels despite a major incidence of DGF.

These results seems confirme that the liver allograft has an immunoprotective effect on the renal allograft from the same donor.

Simultaneous Transplant

Immunological advantage of the same donor

Transplantation 2009;87:1415

- In a SLKT, recipient IR would be directed toward common antigens shared by the liver and kidney allografts.
- In the setting of KALT, the IR would be directed to many antigens not shared by the kidney and the liver allografts.

Renal Graft Outcome in KALT Vs SLKT; Analysis of UNOS Database

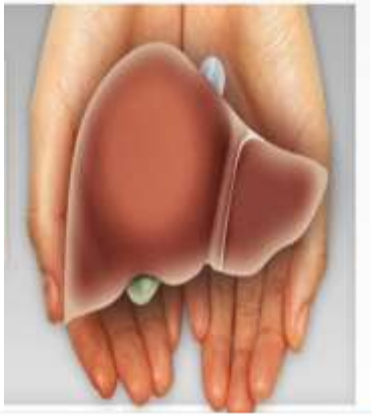
UNOS 1996-2003	Renal Half life	Chronic rejection	1 year rejection free renal survival	3 years rejection free renal survival
Sequential LKT 352	6.6 y	4.6%	77%	67%
simultaneous LKT 1,136	11.7 y	1.2%	85%	79%

Simpson N, *Transplantation, November 2006*

CLKT In our centers (n= 10/33)

Etiology	Donors	TX	age
1ry hyperoxaluria I	Mother	simultaneous	4ys
1ry hyperoxaluria I	2 brothers	simultaneous	9ys
1ry hyperoxaluria 1	Father	Sequential LAKT (3 Ws)	11 ys
1ry hyperoxaluria (3)	2 unrelated	simultaneous	12ys
1ry hyperoxaluria (n=4)	2 unrelated	Sequential	8,11,16ys
Post HCV 1	2 unrelated	simultaneous	50ys
Post HCV (n=22)	2 unrelated	Sequential	

Case 1



Case 1

- A 16-year-old boy,58 kgm diagnosed as a 1ry hyperoxaluria at age of 5 and kept on HD at age of 11 for ESRD .

- <u>The diagnosis based on :</u>

1. Nephrocalcinosis.
2. Oxalate crystals.
3. Stones passing.

Case 1

The diagnosis was confirmed by :

Molecular genetic testing of AGT activity

- Planned to receive sequential liver/kidney Tx

Pre-operative Workup

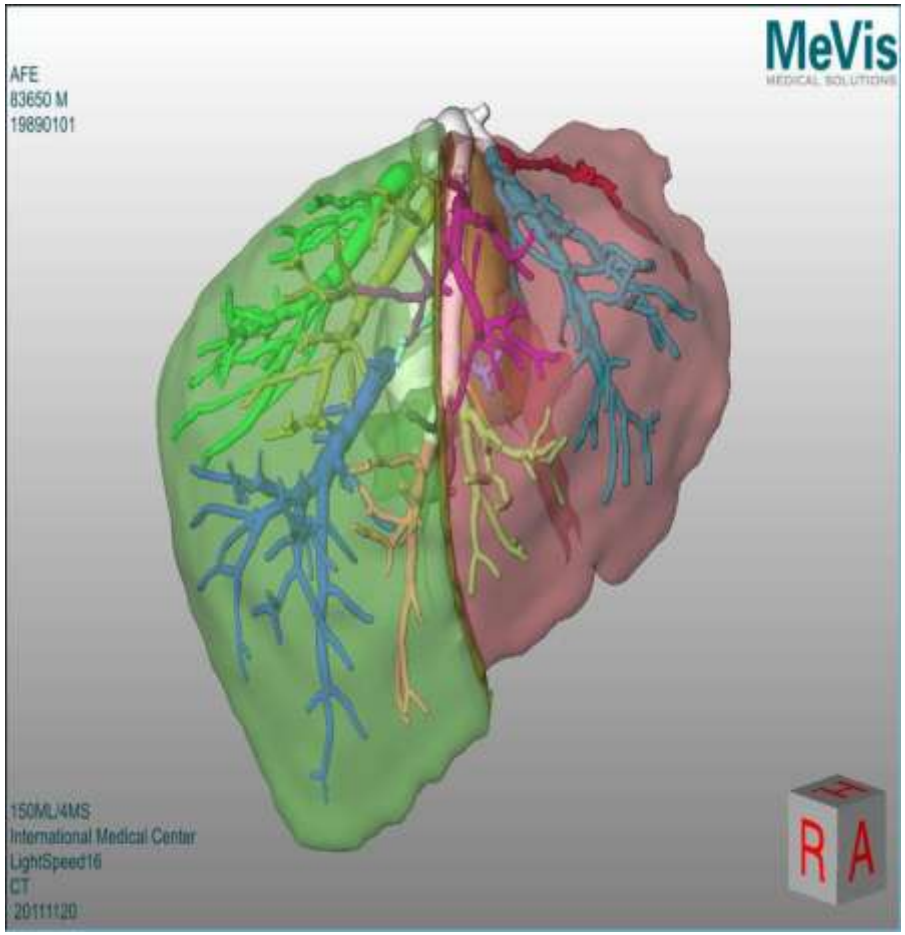
- Screening for infections.
- Immunizations including influenza, pneumococcal ,HBV.
- Optimized dialysis treatment .
- Correction of malnutrition and anemia..
- Donor selection .

.

- Right Lobe Graft Volume 761 mls

- Right Lobe Graft Weight 693 gms

- Remnant Liver Volume 39.5%



Case 1

- Postoperative liver tx passed uneventful with good liver functions and continued on HD.
- 3 months later , received renal graft.
- Induction was by Basiliximab 10 mg D0 & D4.
- Post-operative immunosuppression consisted of same maintenance doses of cyclosporine , prednisolone and mycophenolate

Case 1

- 3 months later, admitted because of rise of body temperature, right hypochondrial pain with discolored urine.
- <u>Investigations revealed:</u>

1. Normal renal function tests.
2. Abnormal liver functions (rise of levels of AST ,ALT , GGT ,alkaline phosphatase and mixed hyperbilirubinemia).
3. Urine: oxalate crystals +++.
4. CMV – IgM & PCR were +ve

Case 1

- Received 900 mg valagancyclovir/d
- General condition had improved within 2 weeks but liver enzymes and S.bilirubin were remained high.
- Liver biopsy was ordered and revealed acute cellular rejection

Case 1

- He received IV 250 mg solumedrol for 5 days.
- Cyclosporine was replaced by Tacrolimus o.75 mg/d reaching therapeutic trough level within one week(8 ng/ml).
- Marked improvement of general condition with back to normal liver function tests.
- No renal affection had been detected during CMV infection or acute hepatic graft rejection.

Message: CMV & Liver rejection A bidirectional relationship

- CMV Infection is v.common in liver transplant recipients compared to other solid organ transplant recipients.
- CMV influences the outcome of liver Tx as it promotes :

1. Acute and chronic allograft rejection.
2. Hepatitis C recurrence, and other opportunistic infections.

Message: Significance of Urinary Oxalate

- After transplantation, there is gradual mobilization of tissue oxalate deposits, and elevated U.oxalate excretion may persist for as long as 2 years .

- Medical therapy (high fluid intake, neutral phosphate and potassium citrate) are encouraged.

- The duration of medical therapy is decided on an individual basis as the amount of tissue stores vary.

Am J Transplant 2010; 10:2493

Case 2

Case 2

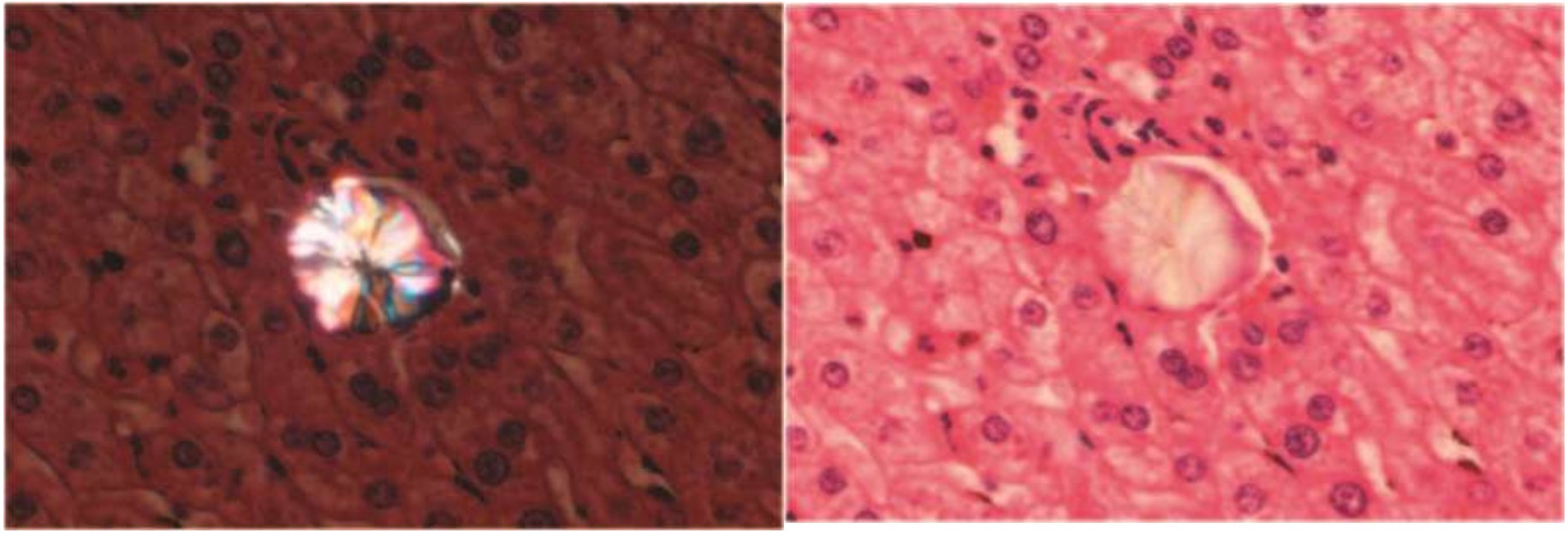
- 9-year-old boy,18 kgm diagnosed as a 1ry HO and kept on HD for 4 years.
- He had osteoarticular manifestations with poor response to erythropoietin therapy.
- Received SLKT 3 months ago.
- Induction was by Basiliximab 10 mg D0 & D4.
- Post-operative IS consisted of prograf , prednisolone and mycophenolate

Case 2

- Postoperative passed with good renal/liver functions .
- On the 4th postoperative day , Duplex U/S revealed hepatic artery thrombosis that required surgical reconstructive anastomosis .
- Native liver showed vascular oxalosis and intraoperative tissues biopsy highlighted aggressive oxalosis that required intensifying medical therapy.

Primary hyperoxaluria involving the liver and hepatic artery: images of an aggressive disease

- The kidneys are the prime target for calcium oxalate deposition which lead to ESRD.



***Kidney International* (2010) 77, 651;**

Published online 2011 September 6. doi: 10.1007/8904_2011_67

Hyperoxaluria and Rapid Development of Renal Failure Following a Combined Liver and Kidney Transplantation: Emphasis on Sequential Transplantation

Ahmed M. Alkhunaizi,[1] Nouriya A. Al-Sannaa,[2] and Wasim F. Raslan[3]

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Abstract

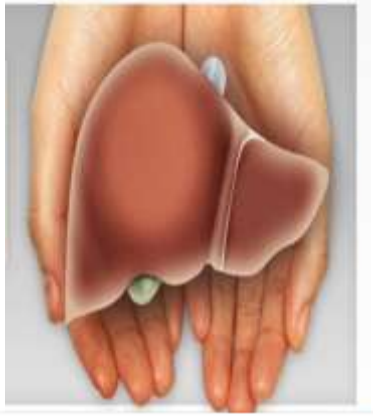
Go to:

Primary hyperoxaluria type I (PH I) is a rare genetic disorder that leads to end stage renal disease (ESRD) at an early age due to excessive deposition of calcium oxalate in the kidney. Combined liver-kidney transplantation (LKTx) has been advocated as the treatment of choice for patients with PH I who have progressive renal disease. With combined LKTx the risk of early renal failure secondary to oxalate deposition is anticipated. Here we report a patient with PH I who developed ESRD and underwent a combined LKTx. He lost the kidney graft secondary to early recurrence of oxalosis. Repeat kidney transplantation 13 months after the initial procedure was successful. Elevated plasma oxalate levels persisted for a long time following LKTx and lead to further deposition of oxalate in the second kidney graft. Combined LKTx for patients with PH I requires meticulous preparation and very careful post operative management. Sequential liver transplantation followed by kidney transplantation is to be considered for PH I patients who have ESRD and very high oxalate load.

Message: Detection of Systemic Oxalosis

- ECG: cardiac conduction defects.
- Osteo-articular manifestations .
- Good response to erythropoietin.
- Normal fundus examination .
- No hypothyroidism.
- No skin manifestations.
- Intraoperative tissue biopsy

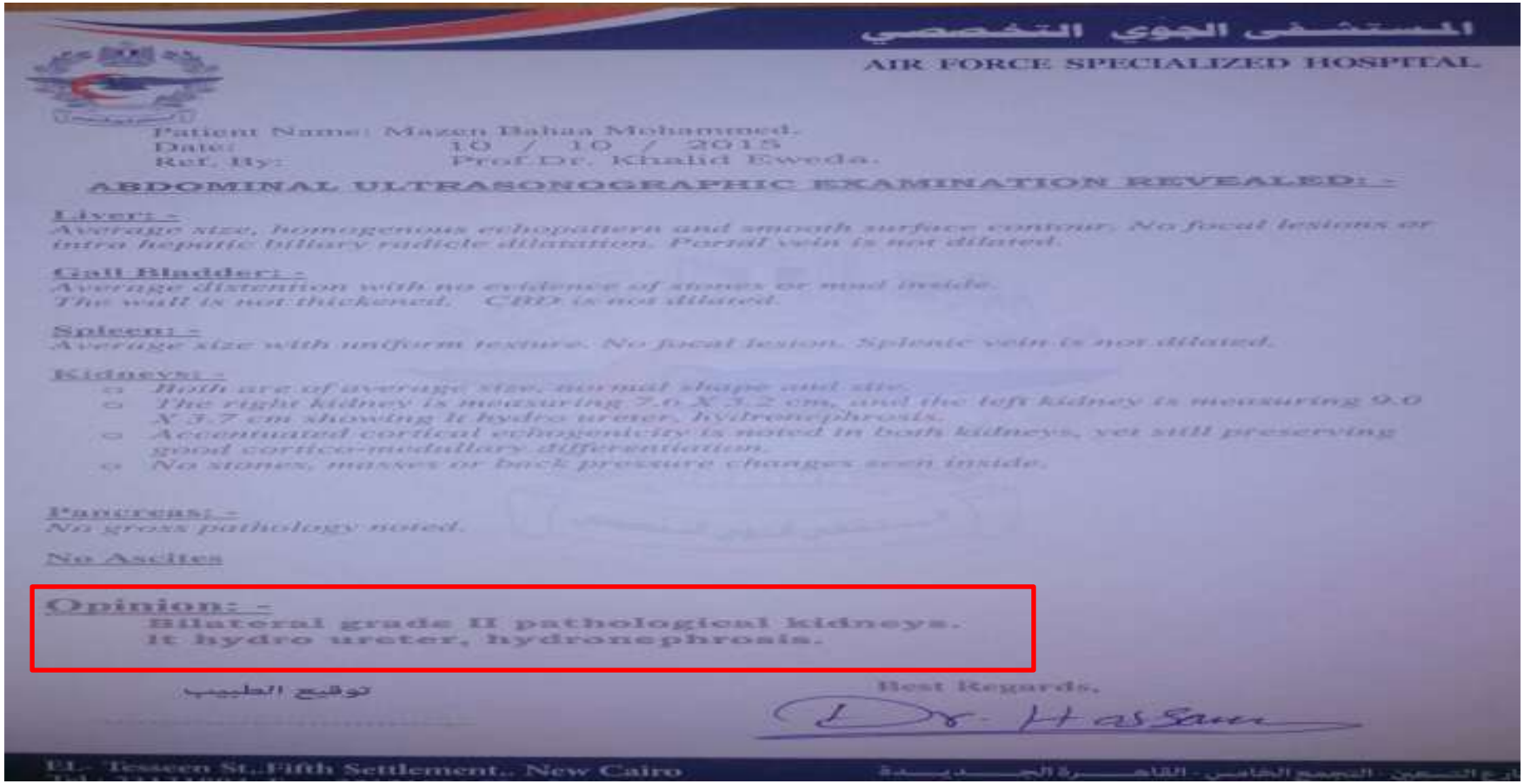
Case 3



Case 3

- 11-y- old boy referred to our center for renal transplantation by the end of 2015.
- He was evaluated because of loss of weight and anemia and discovered to have ESRD.
- He was kept on HD 3 sessions /week

Case 3



المستشفى الجوي التخصصي
AIR FORCE SPECIALIZED HOSPITAL

Patient Name: Mazen Bahaa Mohammed.
Date: 10 / 10 / 2015
Ref. By: Prof.Dr. Khalid Eweda.

ABDOMINAL ULTRASONOGRAPHIC EXAMINATION REVEALED: -

Liver: -
Average size, homogeneous echopattern and smooth surface contour. No focal lesions or intra hepatic biliary radicle dilatation. Portal vein is not dilated.

Gall Bladder: -
Average distention with no evidence of stones or mud inside. The wall is not thickened. CBD is not dilated.

Spleen: -
Average size with uniform texture. No focal lesion. Splenic vein is not dilated.

Kidneys: -
- *Both are of average size, normal shape and site.*
- *The right kidney is measuring 7.0 X 3.2 cm, and the left kidney is measuring 9.0 X 3.7 cm showing lt hydro ureter, hydronephrosis.*
- *Accentuated cortical echogenicity is noted in both kidneys, yet still preserving good cortico-medullary differentiation.*
- *No stones, masses or back pressure changes seen inside.*

Pancreas: -
No gross pathology noted.

No Ascites

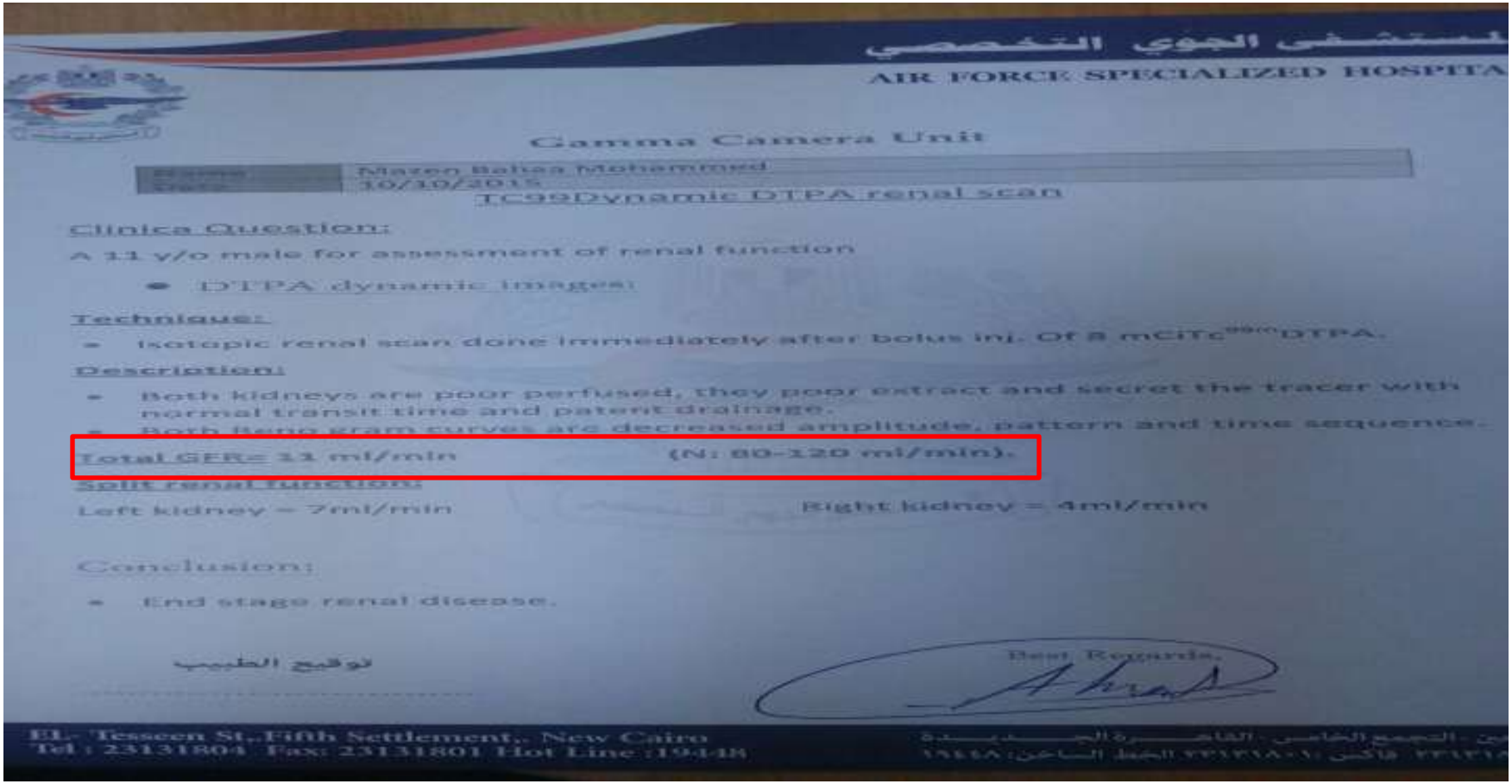
Opinion: -
Bilateral grade II pathological kidneys.
lt hydro ureter, hydronephrosis.

توقيع الطبيب

Best Regards,
Dr. Hassan

El- Tessem St.,Fifth Settlement., New Cairo

Case 3



AIR FORCE SPECIALIZED HOSPITAL

Gamma Camera Unit

Name: Nazen Bahaa Mohammed
Date: 10/10/2015

Tc99Dynamic DTPA renal scan

Clinica Question:

A 11 y/o male for assessment of renal function

- DTPA dynamic images:

Techniques:

- Isotopic renal scan done immediately after bolus inj. Of 8 mCiTc^{99m}DTPA.

Description:

- Both kidneys are poor perfused, they poor extract and secret the tracer with normal transit time and patent drainage.
- Both Gamma cram curves are decreased amplitude, pattern and time sequence.

Total GFR= 11 ml/min (N: 80-120 ml/min).

Split renal function:

Left kidney = 7ml/min Right kidney = 4ml/min

Conclusion:

- End stage renal disease.

توقيع الطبيب

Best Regards,

EL- Tesseen St.,Fifth Settlement., New Cairo
Tel : 23131804 Fax: 23131801 Hot Line :19448

Case 3

المستشفى الجوى التخصصى
AIR FORCE SPECIALIZED HOSPITAL

Name		Location		Pt. Code	71613
Age	31 Y	Sex	Male	Lab. Code	72030
Time in	13-10-2015	Print Date	13-10-2015	Room	

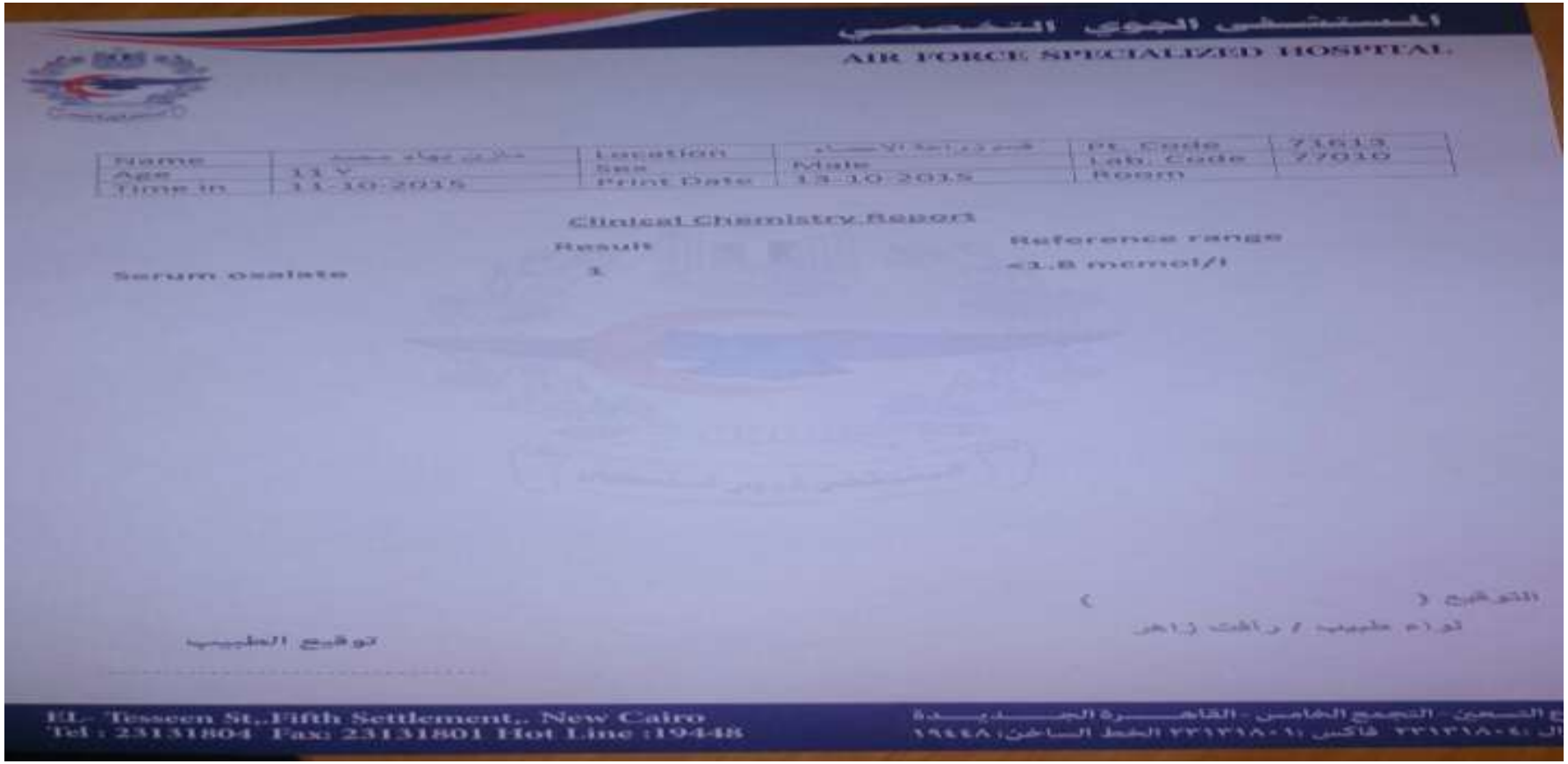
Urine analysis

	Result	Reference range
Oxalate in urine	25	(9.7-40.5 mg)

توقيع الطيب

IE- Tesseen St.,Fifth Settlement., New Cairo
Tel : 23131804 Fax: 23131801 Hot Line :19448

Case 3



المستشفى الجوي التخصصي
AIR FORCE SPECIALIZED HOSPITAL

Name		Location		Pt. Code	71613
Age	13 Y	Sex	Male	Lab. Code	77019
Time in	11-10-2015	Print Date	13-10-2015	Room	

Clinical Chemistry Report

	Result	Reference range
Serum oxalate	1	<3.8 mcmol/l

توقيع الطبيب

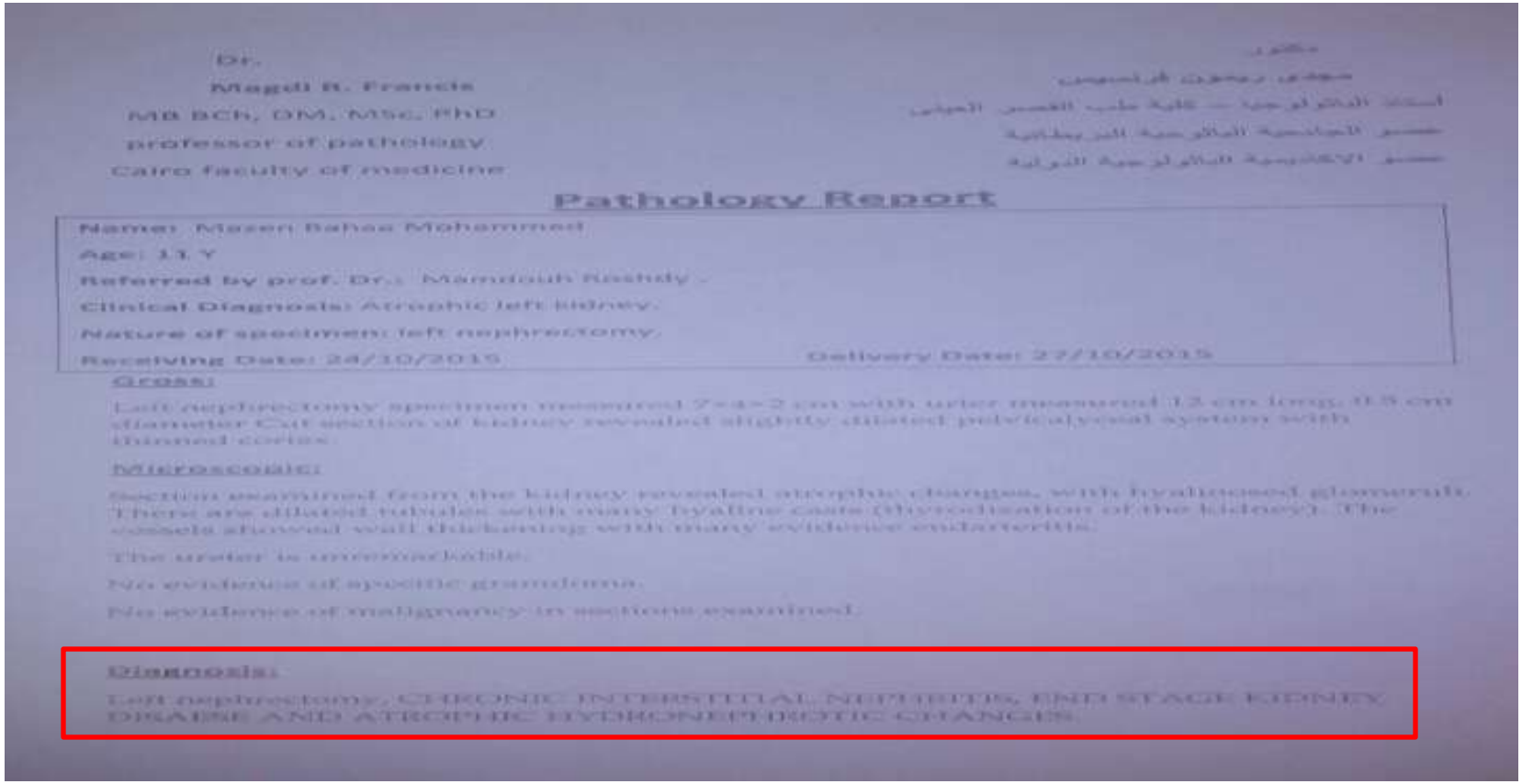
التوقيع (
توقيع طبيب / رائد زاهر

11, Tesseen St.,Fifth Settlement., New Cairo
Tel : 23131804 Fax: 23131801 Hot Line :19448

Case 3

- He received renal graft on December 2015
- The Donor is the father.
- Lt. nephrectomy was done.
- Discharged one week later with excellent RFTs.
- Pathological examination confirmed ESRD due to interstitial nephritis .

Case 3



Dr.
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Cairo faculty of medicine

دكتور
مجدي رمزي فرانسيس
استاذ الباثولوجيا — كلية طب القصر العيني
عضو الجمعية الباثولوجية البريطانية
عضو الأكاديمية الباثولوجية الدولية

Pathology Report

Name: Nasser Rahaa Mohammed
Age: 11 Y
Referred by prof. Dr.: Mamdouh Rashdy
Clinical Diagnosis: Atrophic left kidney.
Nature of specimen: left nephrectomy.
Receiving Date: 24/10/2015 Delivery Date: 27/10/2015

Gross:

Left nephrectomy specimen measured 7×4×2 cm with ureter measured 12 cm long, 0.5 cm diameter. Cut section of kidney revealed slightly dilated pelvicalyceal system with thinned cortex.

Microscopic:

Sections examined from the kidney revealed atrophic changes, with hyalinosed glomeruli. There are dilated tubules with many hyaline casts (thyroidization of the kidney). The vessels showed wall thickening with many evidence endarteritis.

The ureter is unremarkable.

No evidence of specific granuloma.

No evidence of malignancy in sections examined.

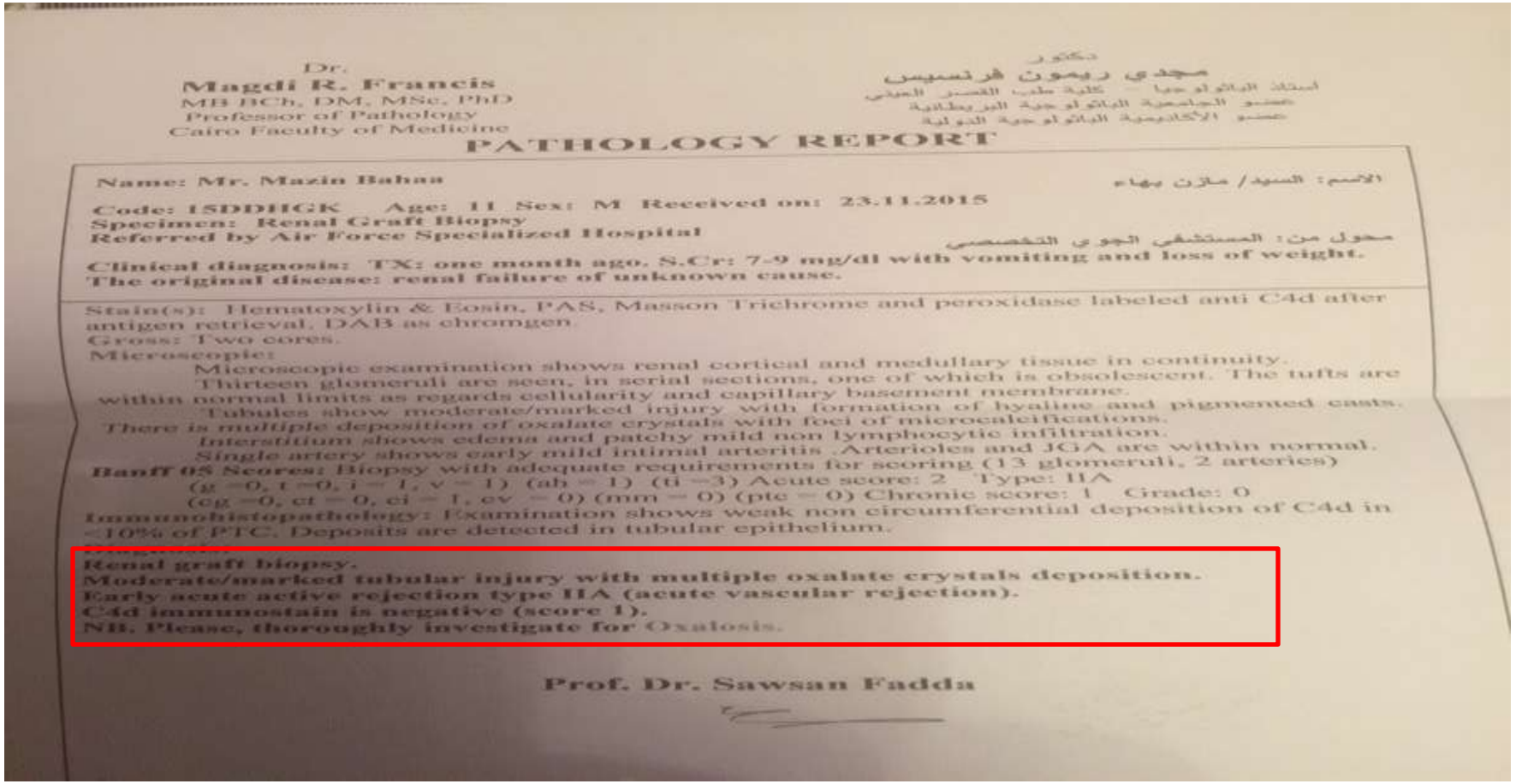
Diagnosis:

Left nephrectomy, CHRONIC INTERSTITIAL NEPHRITIS, END STAGE KIDNEY DISEASE AND ATROPHIC HYPERTENSIVE CHANGES.

Case 3

- Patient readmitted after 10 days due to oliguria associated with high serum creatinine 7mg%, Fk 11 ng/ml , elevated RI .
- The graft was biopsied and we started steroid pulses.
- Biopsy show massive oxalate deposition without fibrosis

Case 3



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دكتور
مجدي رءوف فرنسيس
استاذ الباثولوجيا — كلية طب القصر العيني
عضو الجامعية الباثولوجية البريطانية
عضو الأكاديمية الباثولوجية الدولية

PATHOLOGY REPORT

Name: Mr. Mazin Bahaa الاسم: السيد/ مازن بهاء

Code: 15DDIGK Age: 11 Sex: M Received on: 23.11.2015
Specimen: Renal Graft Biopsy
Referred by Air Force Specialized Hospital محول من: المستشفى الجوي التخصصي

Clinical diagnosis: TX: one month ago. S.Cr: 7-9 mg/dl with vomiting and loss of weight.
The original disease: renal failure of unknown cause.

Stain(s): Hematoxylin & Eosin, PAS, Masson Trichrome and peroxidase labeled anti C4d after antigen retrieval, DAB as chromgen.
Gross: Two cores.
Microscopic:
Microscopic examination shows renal cortical and medullary tissue in continuity.
Thirteen glomeruli are seen, in serial sections, one of which is obsolescent. The tufts are within normal limits as regards cellularity and capillary basement membrane.
Tubules show moderate/marked injury with formation of hyaline and pigmented casts. There is multiple deposition of oxalate crystals with foci of microcalcifications.
Interstitium shows edema and patchy mild non lymphocytic infiltration.
Single artery shows early mild intimal arteritis .Arterioles and JGA are within normal.
Banff 05 Scores: Biopsy with adequate requirements for scoring (13 glomeruli, 2 arteries)
(g = 0, t = 0, i = 1, v = 1) (ah = 1) (ti = 3) Acute score: 2 Type: IIA
(cg = 0, ct = 0, ci = 1, cv = 0) (mm = 0) (ptc = 0) Chronic score: 1 Grade: 0
Immunohistopathology: Examination shows weak non circumferential deposition of C4d in <10% of PTC. Deposits are detected in tubular epithelium.

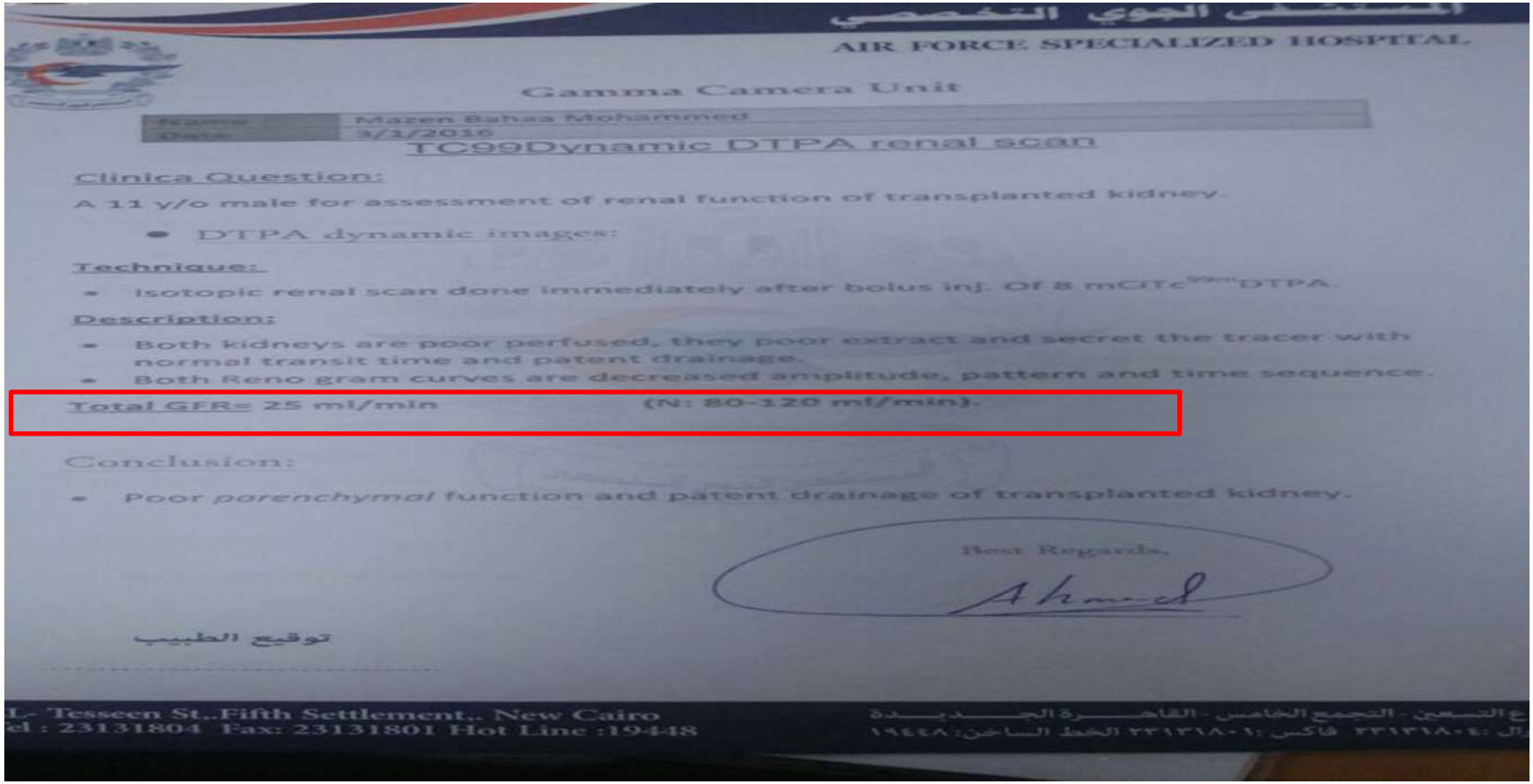
Renal graft biopsy.
Moderate/marked tubular injury with multiple oxalate crystals deposition.
Early acute active rejection type IIA (acute vascular rejection).
C4d immunostain is negative (score 1).
NB. Please, thoroughly investigate for Oxalosis.

Prof. Dr. Sawsan Fadda

Case 3

- A diagnosis of 1ry hyperoxaluria let us think liver transplantation.
- The patient maintained on daily HDF , oxalate free diet , increase fluid intake , N.phosphate and Mg oxide
- Urine out put increased to 1.2 L/d and s.creatinine went down to 1.6 mg%
- Planned to receive hepatic graft 3 weeks later.
- The donor was the father.
- Doing isotope scan before liver transplantation

Case 3



المستشفى الجوي التخصصي
AIR FORCE SPECIALIZED HOSPITAL
Gamma Camera Unit

Name: Mazen Bahaa Mohammed
Date: 3/1/2016

TC99Dynamic DTPA renal scan

Clinica Question:

A 11 y/o male for assessment of renal function of transplanted kidney.

- DTPA dynamic images:

Technique:

- Isotopic renal scan done immediately after bolus inj. Of 8 mCiTc^{99m}DTPA.

Description:

- Both kidneys are poor perfused, they poor extract and secret the tracer with normal transit time and patent drainage.
- Both Reno gram curves are decreased amplitude, pattern and time sequence.

Total GFR= 25 ml/min (N: 80-120 ml/min).

Conclusion:

- Poor *parenchymal* function and patent drainage of transplanted kidney.

Best Regards,

Ahmed

توقيع الطبيب

L- Tesseen St.,Fifth Settlement,, New Cairo
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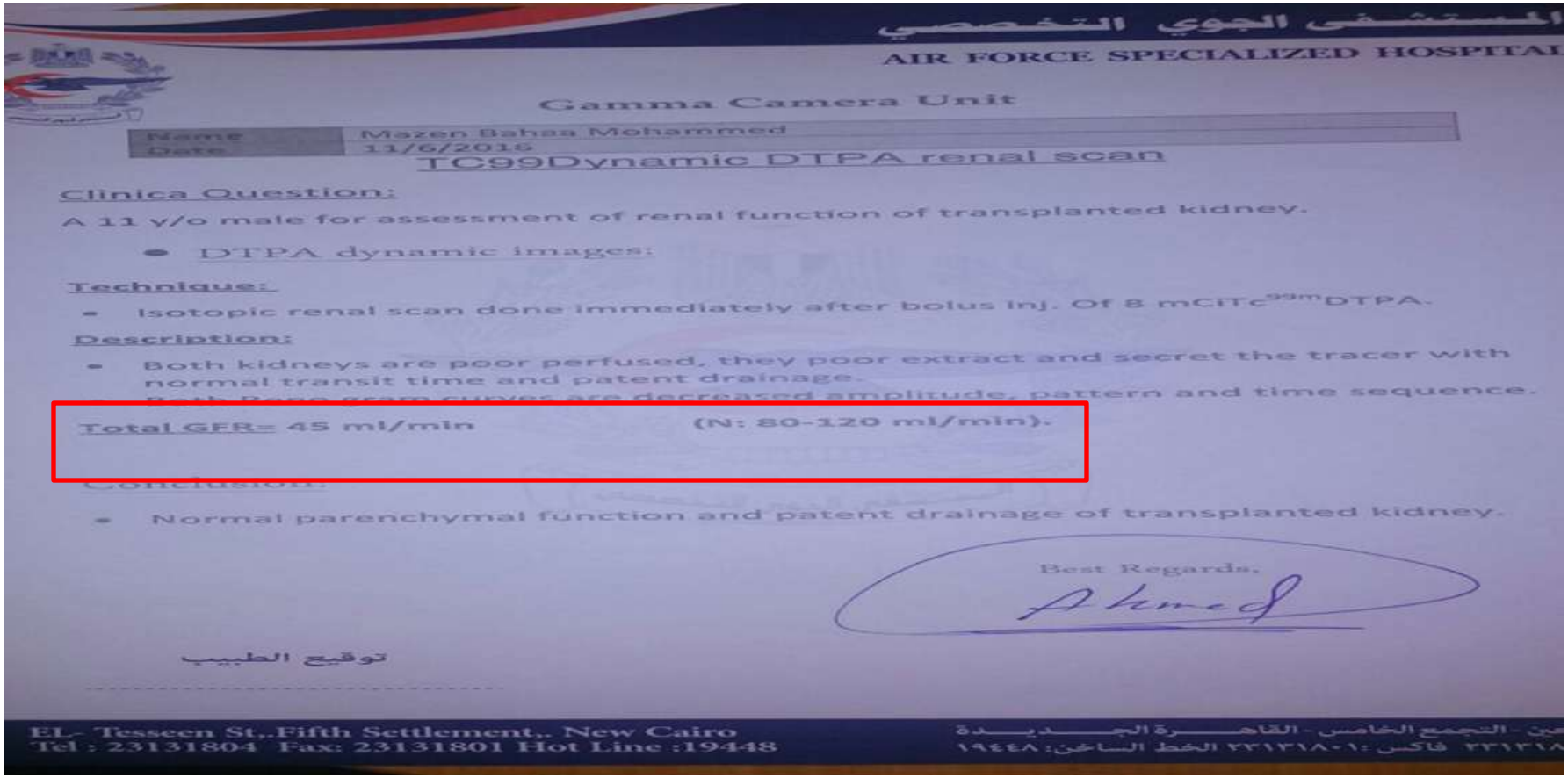
ع التسعين - التجمع الخامس - القاهرة الجديدة
فاكس: ٢٣١٣١٨٠١ الخط الساخن: ١٩٤٤٨

Case 3

- After liver transplantation patient became alert concuss extubated after 48 hours
- Liver enzymes landed to normal
- Urine output 3 L/d
- Kidney functions were within normal
- Fk level 9 ng/dl
- But still on same protocol to remove load of oxalosis
- Isotopic renal scanning 10 days following liver transplantation was improving .

Case 3



المستشفى الجوي التخصصي
AIR FORCE SPECIALIZED HOSPITAL

Gamma Camera Unit

Name: Mazen Bahaa Mohammed
Date: 11/6/2018

TC99Dynamic DTPA renal scan

Clinica Question:

A 11 y/o male for assessment of renal function of transplanted kidney.

- DTPA dynamic images:

Techniqus:

- Isotopic renal scan done immediately after bolus inj. Of 8 mCiTc^{99m}DTPA.

Description:

- Both kidneys are poor perfused, they poor extract and secret the tracer with normal transit time and patent drainage.
- Both Renogram curves are decreased amplitude, pattern and time sequence.

Total GFR= 45 ml/min (N: 80-120 ml/min).

Conclusion:

- Normal parenchymal function and patent drainage of transplanted kidney.

Best Regards,

Ahmed

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التجمع الخامس - القاهرة الجديدة
فاكس: ٢٣١٣١٨٠١ الخط الساخن: ١٩٤٤٨

Case 3

- One week later, liver enzymes elevated.
- Duplex showed thrombosed hepatic artery that required urgent re-anastomosis.
- 2 days later , Patient entered into respiratory failure and unfortunately he passed away.

Conclusion

Hyperoxaluria should be suspected in any patient with a history of urolithiasis and/or Nephrocalcinosis.

Such patients should be referred to centers with access to appropriate biochemical and genotyping facilities.

An early and accurate diagnosis leading to aggressive supportive treatment is a major factor in short- and long-term outcomes.

- Early pre-emptive transplantation should be considered in those with impaired renal function at an early stage (CKD Stage 3b)

- We believe that in the absence of cadaveric transplantation program in our country and the advantages of simultaneous liver/kidney transplant using living donor , may provide a chance for patients with 1ry oxaluria type 1.

References

- United Network for Organ Sharing (UNOS).
- Organ Procurement Transplantation Network (OPTN).
- European Society for Organ Transplantation (ESOT) .
- Nephrol Dial Transplant
- Transplantation
- Liver transpl.


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Thank You
Tissues Donation is a Life Gift
But
Donor Safety Must Take The
Highest Priority